**Citation:**

Trepka MJ, Newman FL, Dixon Z, Huffman FG. Food safety practices among pregnant women and mothers in the women, infants and children program, Miami, Florida. *J Food Prot.* 2007; 70: 1,230-1,237.

**PubMed ID:** 17536684

**Study Design:**

Cross-sectional study

**Class:**

D - Click here for explanation of classification scheme.

**Research Design and Implementation Rating:**

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To determine baseline food safety practices and predictors of good food handling practices among primarily African American clients and caregivers of pediatric clients served by the Miami-Dade County WIC program.

**Inclusion Criteria:**

All female adults from a Miami-Dade County Health Department WIC clinic (WIC recipients and female guardians of pediatric clients, who were usually the mother or grandmother of the child) able to read and speak English.

**Exclusion Criteria:**

- Female adults not from a Miami-Dade County Health Department WIC clinic
- Male adults
- Not able to read and speak English.

**Description of Study Protocol:**

**Recruitment**

- Subjects were recruited from one of the Miami-Dade County Health Department WIC clinics
- Recruitment occurred once during every time period that the clinic served clients (Monday through Saturday mornings, and Monday through Friday afternoons), April 4-15, 2005
- Research staff approached clients entering the clinic to solicit study participation; consenting clients were enrolled until the quota for the given time period was reached
- Quota for a time period was determined on the basis of the typical census for that time period; quotas for busier time periods were higher than for quieter time periods
- After enrollment, clients were given a copy of the survey and asked to complete it in the clinic

- Clients were given a thank you gift of $10 for their time.

**Design**

Survey captured five constructs of food safety behavior, with the first four from the Partnership for Food Safety Education's Fight BAC! campaign as follows:

- Clean: Six questions concerning washing hands and surfaces often, including one concerning handling bottles or baby food safely
- Separate: Four questions concerning avoiding cross-contamination
- Cook: Eight questions concerning cooking to proper temperature, including one concerning handling bottles or baby food safely
- Chill: Seven questions concerning proper refrigeration, including two concerning handling bottles or baby food safely)
- Avoidance of unsafe foods during pregnancy (two questions).

**Dietary Intake/Dietary Assessment Methodology**

Not applicable

**Blinding used**

Not applicable

**Intervention**

Not applicable

**Statistical Analysis**

- Uni- and multivariate analyses of variance were performed on each of nine participant characteristics (age group; education; race or ethnicity; country of birth; employment status; pregnancy status; number of children; occurrence of diarrhea among any household member in the past month; household member with diabetes, kidney disease, or immuno-suppression or >60 years of age)
- Univariate analyses were performed on a total score across all questionnaire items with nine participant characteristics serving as the fixed effects
- Multivariate analyses of variance to examine participant characteristics on joint and four individual food safety constructs contained in the total score with nine participant characteristics as fixed effects
- Type I error rate was set at $P \leq 0.05$ for each participant characteristic, assuming an independent hypothesis for each participant characteristic
- Size of the effects was evaluated using a partial $\eta^2$ square for each statistical test of a fixed effect; a value of $\eta^2 \geq 0.03$ was considered nontrivial, representing an effect equivalent to ≥3% of the variance attributed to the F-statistic.
- All analyses were conducted by SPSS 14.0 for Windows.

**Data Collection Summary:**

**Timing of Measurements**

All data collected via survey at time of study enrollment.

**Dependent Variables**

- Four construct scores: clean; separate; cook; chill
- Score concerning avoidance of unsafe foods during pregnancy.

Variables measured using 23-item self-administered survey

**Independent Variables**

- Nine participant characteristics:
  - Age
  - Education
  - Race and ethnicity
  - Country of birth
  - Employment status
  - Pregnancy status
  - Number of children
  - Diarrhea among household members in last month
  - Household member at risk for food-borne illnesses.

**Control Variables**

None stated

**Description of Actual Data Sample:**

- ***Initial N:*** 342 eligible clients
- ***Attrition (final N):*** 299 (87.4%) consented to participate
- ***Age:*** 85% were younger than 35 years
- ***Ethnicity:***
  - 64% non-Hispanic, non-Haitian black
  - 27.1% Hispanic
  - 5.8% Haitian
  - 2.7% non-Hispanic white, another race or ethnicity
- ***Other relevant demographics:***
  - 89.4% had graduated from high school
  - 64.8% were born in the United States
  - 34.0% full-time homemakers or unemployed
  - 21.5% were pregnant; 5.9% were WIC clients on the basis of pregnancy alone
  - 20% reported that they or a household member had had diarrhea lasting at least two days with at least three loose stools on one of those days during the past month
  - 14.6% reported that a household member was at higher risk of foodborne disease by being older than 60 years of age or having diabetes, kidney disease, or immunosuppression due to HIV or another disease
- ***Anthropometrics:*** Not applicable
- ***Location:*** One Miami-Dade County, Florida Health Department WIC clinic (inner-city Miami).

**Summary of Results:**

**Key findings**

Food safety behaviors:

- In general, a high percentage of participants reported “almost always’’ or ‘‘always’’ following good practices in the clean and separate constructs, for example: 3.4% of subjects reported not washing their hands after handling raw meat most of the time
- In the cook construct, safe practices were less common, particularly regarding thermometer use, for example:
    - Most participants reported not owning a cooking thermometer and not using a cooking thermometer regularly when cooking large pieces of poultry or meat
    - The proportion of respondents reporting eating undercooked eggs at least some of the time (28.4%) was lower than reported in the Centers for Disease Control and Prevention’s 1996 Behavioral Risk Factor Surveillance Survey (50%)
- Safe practices in the chill construct were not practiced among a sizeable proportion of participants, for example:
    - Regarding the chill construct, almost one-third of participants reported usually leaving food out for more than two hours
    - 61.8% reported thawing foods on the countertop or in the sink in standing water
    - Over 20% of participants reported leaving prepared baby formula or bottled breast milk outside of the refrigerator for more than two hours at least some of the time
- Over one-half (51.6%) of the pregnant women participating in the survey reported eating hot dogs or deli meats without first reheating "sometimes" or more frequently since becoming pregnant, and 35.5% reported eating soft cheeses and blue-veined cheeses "sometimes" or more frequently since becoming pregnant; both practices increasing risk of acquiring listeriosis
- Being pregnant and the number of children a woman had affected the total food safety scores and each construct. Women who were pregnant with their first child had the lowest scores on all dimensions
- Pregnancy status alone affected the total score and the clean construct score, mainly because pregnant women without children made up 73% of the women in the pregnant group.

Factors associated with behaviors:

- There were no statistically significant multivariate effects for any of the major demographic variables, except for educational level
- Univariate effects of educational level and race and ethnicity on the sum of chill construct items were statistically significant but small
- Scores for the chill construct were directly related to the amount of education (i.e., the lower the education level, the lower the score)
- Scores for the chill construct also differed between racial and ethnic groups, but only reached statistical significance between the non-Hispanic, non-Haitian black group and the Hispanic group ($P<0.01$)
- A multivariate effect of statistical significance ($P<0.001$) was found for:
    - Pregnancy status
    - Number of children
    - Diarrhea among a household member
- Those with a history of diarrhea among household members during the past month had lower scores for the clean construct.

**Author Conclusion:**

Study provided three important findings:

- Clients' food safety practices were most problematic in the cook and chill constructs
  - Using a cooking thermometer, refrigerating foods within two hours and thawing foods safely were the practices least commonly reported
- Being pregnant for the first time was the factor most commonly associated with sub-optimal food safety practices
- A high prevalence of pregnant participants ate foods that put them at risk of listeriosis at least some of the time (over one-half for hot dogs, luncheon meats or deli meats that were not reheated to steaming hot and one-third for soft cheeses), although it was unclear which food item the participants were referring to when they reported eating hot dogs, luncheon meat or deli meats).

***Reviewer Comments:***

*Authors noted these limitations:*

- *Food safety practices were self-reported and no actual practices were reported*
- *Although refusal rates were low, those who refused may have been unconcerned with food safety and had worse practices than those who participated*
- *Inconsistencies in responses between two questions about cooking eggs and between the two questions about how promptly foods were chilled (suggesting that almost one third of group was leaving out food for an unsafe period)*
- *Participants were representative in race and ethnicity of the clinic, they were not necessarily representative of other WIC clinics, Florida or the US*
- *The study assessed only self-reported practices and did not assess knowledge or attitudes and thus it was not possible to determine underlying reasons for specific unsafe practices.*

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***Research Design and Implementation Criteria Checklist: Primary Research***

| **Relevance Questions** | | |
|---|---|---|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | N/A |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | N/A |

| **Validity Questions** | | |
|---|---|---|
| **1.** | **Was the research question clearly stated?** | Yes |

| | | |
|---|---|---|
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated? | Yes |
| 1.3. | Were the target population and setting specified? | Yes |
| **2.** | **Was the selection of study subjects/patients free from bias?** | Yes |
| 2.1. | Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study? | Yes |
| 2.2. | Were criteria applied equally to all study groups? | Yes |
| 2.3. | Were health, demographics, and other characteristics of subjects described? | Yes |
| 2.4. | Were the subjects/patients a representative sample of the relevant population? | Yes |
| **3.** | **Were study groups comparable?** | N/A |
| 3.1. | Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT) | N/A |
| 3.2. | Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline? | N/A |
| 3.3. | Were concurrent controls used? (Concurrent preferred over historical controls.) | N/A |
| 3.4. | If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis? | N/A |
| 3.5. | If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.) | N/A |
| 3.6. | If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")? | N/A |
| **4.** | **Was method of handling withdrawals described?** | No |
| 4.1. | Were follow-up methods described and the same for all groups? | N/A |
| 4.2. | Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.) | Yes |

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| 4.3. | Were all enrolled subjects/patients (in the original sample) accounted for? | N/A |
| 4.4. | Were reasons for withdrawals similar across groups? | N/A |
| 4.5. | If diagnostic test, was decision to perform reference test not dependent on results of test under study? | N/A |
| **5.** | **Was blinding used to prevent introduction of bias?** | N/A |
| 5.1. | In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate? | N/A |
| 5.2. | Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.) | N/A |
| 5.3. | In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded? | N/A |
| 5.4. | In case control study, was case definition explicit and case ascertainment not influenced by exposure status? | N/A |
| 5.5. | In diagnostic study, were test results blinded to patient history and other test results? | N/A |
| **6.** | **Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?** | Yes |
| 6.1. | In RCT or other intervention trial, were protocols described for all regimens studied? | N/A |
| 6.2. | In observational study, were interventions, study settings, and clinicians/provider described? | Yes |
| 6.3. | Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect? | N/A |
| 6.4. | Was the amount of exposure and, if relevant, subject/patient compliance measured? | N/A |
| 6.5. | Were co-interventions (e.g., ancillary treatments, other therapies) described? | N/A |
| 6.6. | Were extra or unplanned treatments described? | N/A |
| 6.7. | Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups? | N/A |
| 6.8. | In diagnostic study, were details of test administration and replication sufficient? | N/A |
| **7.** | **Were outcomes clearly defined and the measurements valid and reliable?** | Yes |
| 7.1. | Were primary and secondary endpoints described and relevant to the question? | N/A |
| 7.2. | Were nutrition measures appropriate to question and outcomes of concern? | Yes |

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|---|---|---|
| 7.3. | Was the period of follow-up long enough for important outcome(s) to occur? | N/A |
| 7.4. | Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures? | Yes |
| 7.5. | Was the measurement of effect at an appropriate level of precision? | Yes |
| 7.6. | Were other factors accounted for (measured) that could affect outcomes? | Yes |
| 7.7. | Were the measurements conducted consistently across groups? | N/A |
| **8.** | **Was the statistical analysis appropriate for the study design and type of outcome indicators?** | Yes |
| 8.1. | Were statistical analyses adequately described and the results reported appropriately? | Yes |
| 8.2. | Were correct statistical tests used and assumptions of test not violated? | Yes |
| 8.3. | Were statistics reported with levels of significance and/or confidence intervals? | Yes |
| 8.4. | Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)? | N/A |
| 8.5. | Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)? | Yes |
| 8.6. | Was clinical significance as well as statistical significance reported? | Yes |
| 8.7. | If negative findings, was a power calculation reported to address type 2 error? | N/A |
| **9.** | **Are conclusions supported by results with biases and limitations taken into consideration?** | Yes |
| 9.1. | Is there a discussion of findings? | Yes |
| 9.2. | Are biases and study limitations identified and discussed? | Yes |
| **10.** | **Is bias due to study's funding or sponsorship unlikely?** | Yes |
| 10.1. | Were sources of funding and investigators' affiliations described? | Yes |
| 10.2. | Was the study free from apparent conflict of interest? | Yes |